Water Quality Assessment
Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek
Pagosa Area Water and Sanitation District, Vista Wastewater Treatment Plant

Contents

I. Water Quality Assessment Summary

Table A-1 includes summary information related to this WQA. This summary table includes key regulatory starting points used in development of the WQA such as: receiving stream information; threatened and endangered species; 303(d) and Monitoring and Evaluation listings; low flow and facility flow summaries; and a list of parameters evaluated.

Table A-1
WQA Summary

Facility Information			
Facility Name	**Permit Number**	**Design Flow (max 30-day ave, MGD)**	**Design Flow (max 30-day ave, CFS)**
Vista WWTP	CO0031755	3.75 (Jan.- March) 3.9 (April- Dec.)	5.8 6.0

Receiving Stream Information			
Receiving Stream Name	**Segment ID**	**Designation**	**Classification(s)**
Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek	COSJPI06a	Use Protected	Aquatic Life Warm 2 Recreation Class P Agriculture Water Supply

Low Flows (cfs)			
1E3 (1-day)	**7E3 (7-day)**	**30E3 (30-day)**	**Ratio of 30E3 to the Design Flow (cfs)**
0	0	0	0

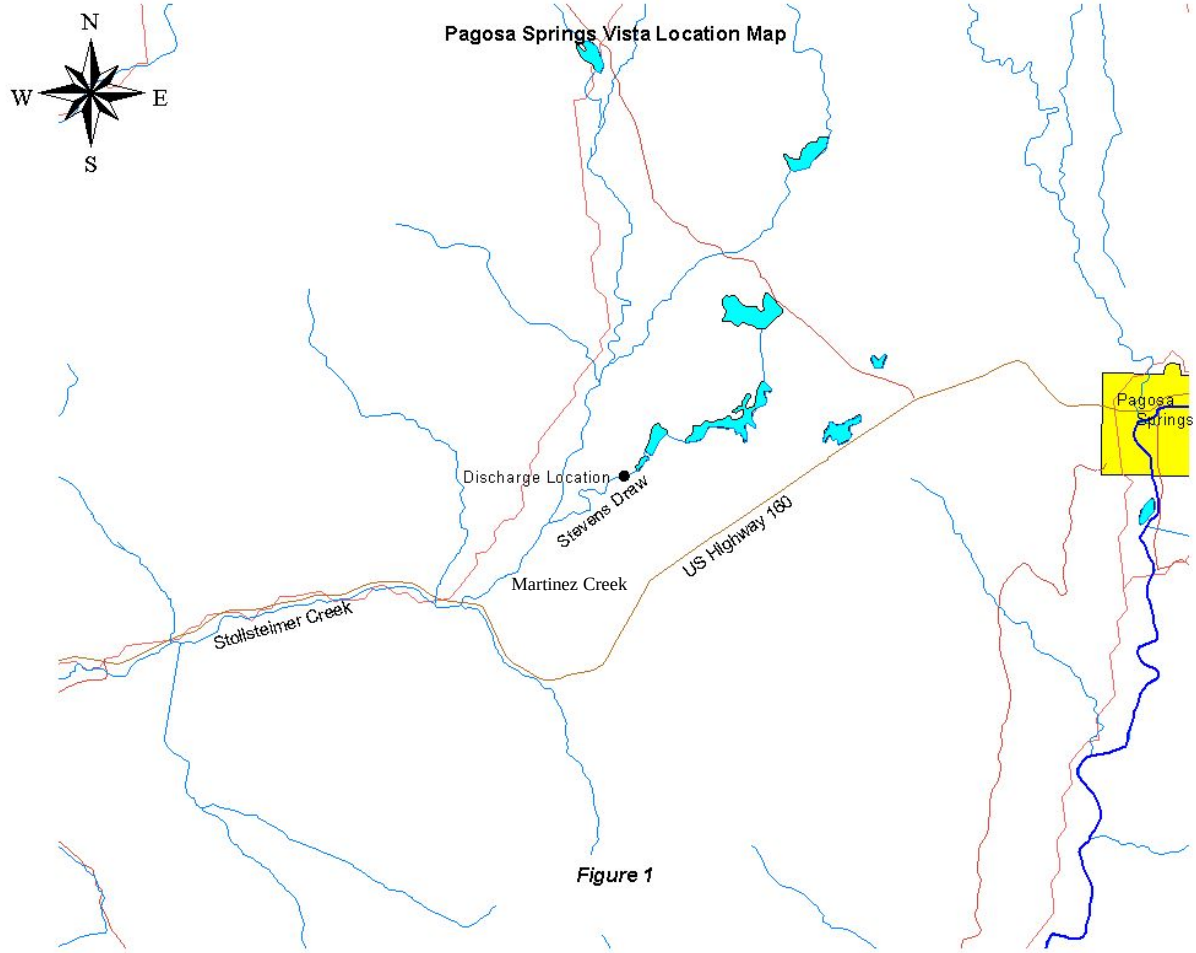
Regulatory Information					
T&E Species	**303(d) (Reg 93)**	**Monitor and Eval (Reg 93)**	**Existing TMDL**	**Temporary Modification**	**Control Regulation**
No	None	Sediment, *E. coli*, Fe(Trec), SO_4 (Stollsteimer Creek above Southern Ute Boundary)	No	None	Reg. 39

Pollutants Evaluated
Ammonia, *E. coli*, TRC, Metals, Temp, SAR, EC, SO_4

II. Introduction

The water quality assessment (WQA) of Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek near the Vista Wastewater Treament Plant (Vista WWTP), located in Archuleta County, is intended to determine the assimilative capacities available for pollutants found to be of concern. This WQA describes how the water quality based effluent limits (WQBELs) are developed. These parameters may or may not appear in the permit with limitations or monitoring requirements, subject to other determinations such as reasonable potential analysis, evaluation of federal effluent limitation guidelines, implementation of state-based technology based limits, mixing zone analyses, 303(d) listings, threatened and endangered species listing, or other requirements as discussed in the permit rationale. Figure A-1 contains a map of the study area evaluated as part of this WQA.

FIGURE A-1



The Vista WWTP discharges to Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek, which is stream segment COSJPI06a. This notation means the San Juan River Basin, Piedra River Sub-basin, Stream Segment 06a. This segment is composed of "All tributaries to the Piedra River, including all wetlands from a point immediately below the confluence with Devil Creek to Southern Ute Indian Reservation boundary." Stream segment COSJPI06a is classified for Aquatic Life Warm 2, Recreation Class P, Water Supply and Agriculture.

This area of Colorado hosts a variety of recreational activities and thus attracts many tourists. This stream segment is listed for Monitoring and Evaluation under Regulation 93 for sediment, *E. coli*, total recoverable iron, and sulfate, specific to Stollsteimer Creek above the Southern Ute boundary.

Information used in this assessment includes data gathered from the Vista Wastewater Treatment Plant, the Division, and the U.S. Environmental Protection Agency (EPA). The data used in the assessment consist of the best information available at the time of preparation of this WQA analysis.

III. Water Quality Standards

Narrative Standards

Narrative Statewide Basic Standards have been developed in Section 31.11(1) of the regulations, and apply to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be free from substances attributable to human-caused point source or nonpoint source discharges in amounts, concentrations or combinations which:

for all surface waters except wetlands;

(i) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludge, mine slurry or tailings, silt, or mud; or (ii) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or (iii) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or (iv) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or (v) produce a predominance of undesirable aquatic life; or (vi) cause a film on the surface or produce a deposit on shorelines; and

for surface waters in wetlands;

(i) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or (ii) are toxic to humans, animals, plants, or aquatic life of the wetland.

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for any parameter of concern could be put in CDPS discharge permits.

Standards for Organic Parameters and Radionuclides

Radionuclides: Statewide Basic Standards have been developed in Section 31.11(2) and (3) of The Basic Standards and Methodologies for Surface Water to protect the waters of the state from radionuclides and organic chemicals.

In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural practices or discharges to as to exceed the following levels, unless alternative site-specific standards have been adopted. Standards for radionuclides are shown in Table A-2.

Table A-2
Radionuclide Standards

Parameter	Picocuries per Liter
Americium 241*	0.15
Cesium 134	80
Plutonium 239, and 240*	0.15
Radium 226 and 228*	5
Strontium 90*	8
Thorium 230 and 232*	60
Tritium	20,000

*Radionuclide samples for these materials should be analyzed using unfiltered (total) samples. These Human Health based standards are 30-day average values for both plutonium and americium.

Organics: The organic pollutant standards contained in the Basic Standards for Organic Chemicals Table are applicable to all surface waters of the state for the corresponding use classifications, unless alternative site-specific standards have been adopted. These standards have been adopted as "interim standards" and will remain in effect until alternative permanent standards are adopted by the Commission. These interim standards shall not be considered final or permanent standards subject to antibacksliding or downgrading restrictions. Although not reproduced in this WQA, the specific standards for organic chemicals can be found in Regulation 31.11(3).

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for radionuclides, organics, or any other parameter of concern could be put in CDPS discharge permits.

The aquatic life standards for organics apply to all stream segments that are classified for aquatic life. The water supply standards apply only to those segments that are classified for water supply. The water + fish standards apply to those segments that have a Class 1 aquatic life and a water supply classification. The fish ingestion standards apply to Class 1 aquatic life segments that do not have a water supply designation. The water + fish and the fish ingestion standards may also apply to Class 2 aquatic life segments, where the Water Quality Control Commission has made such determination.

Because Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek is classified for

Aquatic Life Warm 2, with a water supply designation, only the water supply and aquatic life standards apply to this discharge.

Salinity

Salinity: Regulation 61.8(2)(l) contains requirements regarding salinity for any discharges to the Colorado River Watershed. For industrial dischargers and for the discharge of intercepted groundwater, this is a no-salt discharge requirement. However, the regulation states that this requirement may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 350 tons per year. The Division may permit the discharge of salt upon a satisfactory demonstration that it is not practicable to prevent the discharge of all salt. See Regulation 61.8(2)(l)(i)(A)(1) for industrial discharges and 61.8(2)(l)(iii) for discharges of intercepted groundwater for more information regarding this demonstration.

For municipal dischargers, an incremental increase of 400 mg/l above the flow weighted averaged salinity of the intake water supply is allowed. This may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 366 tons per year. The Division may permit the discharge of salt in excess of the 400 mg/l incremental increase, upon a satisfactory demonstration that it is not practicable to attain this limit. See Regulation 61.8(2)(l)(vi)(A)(1) for more information regarding this demonstration.

In addition, the Division's policy, Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, may be applied to discharges where an agricultural water intake exists downstream of a discharge point. Limitations for electrical conductivity and sodium absorption ratio may be applied in accordance with this policy.

Temperature

Temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life. This standard shall not be interpreted or applied in a manner inconsistent with section 25-8-104, C.R.S.

Segment Specific Numeric Standards

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. The standards in Table A-3 have been assigned to stream segment COSJPI06a in accordance with the *Classifications and Numeric Standards for San Juan River and Dolores River Basins*.

The Water Quality Control Commission has recently completed a preliminary final action concerning the *Classifications and Numeric Standards for San Juan River and Dolores River Basins*. The preliminary final action modifies the classifications for this segment to include additional numeric standards.

An update to the *Classifications and Numeric Standards for San Juan River and Dolores River Basins* that becomes effective in March 2013 will change the applicable temperature, molybdenum, and nonylphenol standards for stream segment COSJPI06a. This WQA has been developed in conformance with the water quality standards that will become effective in March 2013 as any

permitting action based on this WQA would take effect immediately after (or just prior) to the effective date of this regulation.

Table A-3 **In-stream Standards for Stream Segment COSJPI06a**
Physical and Biological
Dissolved Oxygen (DO) = 5 mg/l, minimum
pH = 6.5 - 9 su
E. coli chronic = 205 colonies/100 ml
Temperature March-Nov = 27.5° C MWAT and 28.6° C DM*
Temperature Dec-Feb = 13.8° C MWAT and 14.3° C DM*
Inorganic
Total Ammonia acute and chronic = TVS
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.05 mg/l
Nitrate acute = 10 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = For WS, the greater of ambient water quality as of January 1, 2000 or 250 mg/l
Metals
Total Recoverable Aluminum acute and chronic = TVS
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 0.02 - 10 µg/l
Dissolved Cadmium acute and chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Total Recoverable Trivalent Chromium chronic= TVS
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolved Iron chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 300 µg/l
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 50 µg/l
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 210 µg/l
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Dissolved Silver acute and chronic = TVS
Dissolved Zinc acute and chronic = TVS
Molybdenum chronic= 160 µg/l*
Nonylphenol acute = 28 µg/l
Nonylphenol chronic = 6.6 µg/l

*: New numeric standards

Arsenic Range: For chronic total recoverable arsenic, the range of standards applies at the point of intake to a water supply. But, as there are no downstream water intakes from Vista WWTP, the chronic total recoverable arsenic standard for water supplies is not applied. Instead, the agricultural standard for total recoverable of 100 ug/l will apply, based on Regulation 31.

Table Value Standards and Hardness Calculations

Standards for metals are generally shown in the regulations as Table Value Standards (TVS), and these often must be derived from equations that depend on the receiving stream hardness or species of fish present; for ammonia, standards are discussed further in Section IV of this WQA. The Classification and Numeric Standards documents for each basin include a specification for appropriate hardness values to be used. Specifically, the regulations state that:

> The hardness values used in calculating the appropriate metal standard should be based on the lower 95% confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used.

The mean hardness of Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek was computed to be 460 mg/l based on sampling data from Division Station 9245 (Stollsteimer Creek at Hwy 151) located downstream from the WWTP on Stollsteimer Creek. The *Basic Standards and Methodologies for Surface Water* indicates that hardness must be capped at 400 mg/l when determining in-stream metal water quality standards using the equations in the TVS. This maximum hardness value and the formulas contained in the TVS were used to calculate the in-stream water quality standards for metals, with the results shown in Table A-4.

Table A-4

TVS-Based Metals Water Quality Standards for CO0031755

Based on the Table Value Standards Contained in the Colorado Department of Public Health and Environment Water Quality Control Commission *Regulation 34*

Parameter	***In-Stream Water Quality Standard***			***TVS Formula: Hardness (mg/l) as CaCO3 =*** **400**
Aluminum, Total Recoverable	Acute	10071	µg/l	$e^{(1.3695(\ln(\text{hardness}))+1.8308)}$
	Chronic	87	µg/l	$e^{(1.3695(\ln(\text{hardness}))-0.1158)}$
Cadmium, Dissolved	Acute	9.1	µg/l	$[1.136672-0.041838\ln(\text{hardness})]e^{(0.9151(\ln(\text{hardness}))-3.1485)}$
	Chronic	1.2	µg/l	$[1.101672-0.041838\ln(\text{hardness})]e^{(0.7998(\ln(\text{hardness}))-4.4451)}$
Trivalent Chromium, Dissolved	Acute	1773	µg/l	$e^{(0.819(\ln(\text{hardness}))+2.5736)}$
	Chronic	231	µg/l	$e^{(0.819(\ln(\text{hardness}))+0.5340)}$
Hexavalent Chromium, Dissolved	Acute	16	µg/l	Numeric standards provided, formula not applicable
	Chronic	11	µg/l	Numeric standards provided, formula not applicable
Copper, Dissolved	Acute	50	µg/l	$e^{(0.9422(\ln(\text{hardness}))-1.7408)}$
	Chronic	29	µg/l	$e^{(0.8545(\ln(\text{hardness}))-1.7428)}$
Lead, Dissolved	Acute	281	µg/l	$[1.46203-0.145712\ln(\text{hardness})][e^{(1.273(\ln(\text{hardness}))-1.46)}]$

	Chronic	11	µg/l	$[1.46203-0.145712\ln(\text{hardness})][e^{(1.273(\ln(\text{hardness}))-4.705)}]$
Manganese, Dissolved	Acute	4738	µg/l	$e^{(0.3331(\ln(\text{hardness}))+6.4676)}$
	Chronic	2618	µg/l	$e^{(0.3331(\ln(\text{hardness}))+5.8743)}$
Nickel, Dissolved	Acute	1513	µg/l	$e^{(0.846(\ln(\text{hardness}))+2.253)}$
	Chronic	168	µg/l	$e^{(0.846(\ln(\text{hardness}))+0.0554)}$
Selenium, Dissolved	Acute	18.4	µg/l	Numeric standards provided, formula not applicable
	Chronic	4.6	µg/l	Numeric standards provided, formula not applicable
Silver, Dissolved	Acute	22	µg/l	$½\ e^{(1.72(\ln(\text{hardness}))-6.52)}$
	Chronic	3.5	µg/l	$e^{(1.72(\ln(\text{hardness}))-9.06)}$
Uranium, Dissolved	Acute	11070	µg/l	$e^{(1.1021(\ln(\text{hardness}))+2.7088)}$
	Chronic	6915	µg/l	$e^{(1.1021(\ln(\text{hardness}))+2.2382)}$
Zinc, Dissolved	Acute	467	µg/l	$0.978e^{(0.8525(\ln(\text{hardness}))+1.0617)}$
	Chronic	405	µg/l	$0.986\ e^{(0.8525(\ln(\text{hardness}))+0.9109)}$
Zinc, Dissolved	Acute	467	µg/l	$0.978e^{(0.8525(\ln(\text{hardness}))+1.0617)}$
	Chronic	2296	µg/l	$e^{(2.227(\ln(\text{hardness}))-5.604)}$

Total Maximum Daily Loads and Regulation 93 – Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List

This stream segment is not listed on the Division's 303(d) list of water quality impacted streams.

Downstream portions of this stream segment are listed for Monitoring and Evaluation for sediment, *E. coli*, total recoverable iron, and sulfate. According to Division standard procedure, the Division's Environmental Data Unit investigates issues of water quality standard exceedances. If it is determined that the water body is impaired, the segment will be added to the 303(d) list. At a minimum, the permit may contain monitoring requirements to support a future TMDL if the segment is listed.

For a receiving water placed on this list, the Restoration and Protection Unit is tasked with developing the Total Maximum Daily Loads (TMDLs) and the Waste Load Allocation (WLAs) to be distributed to the affected facilities. WLAs for sediment, *E. coli*, total recoverable iron, and sulfate have not yet been established and the allowable concentration calculated in the following sections may change upon further evaluation by the Division. There are also no numeric water quality standards for sediment and therefore assimilative capacities are not calculated.

IV. Receiving Stream Information

Low Flow Analysis

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval, and is used in

developing limitations based on an acute standard. The 7-day average low flow, 7E3, represents the seven-day average low flow recurring in a 3 year interval, and is used in developing limitations based on a Maximum Weekly Average Temperature standard (MWAT). The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval, and is used in developing limitations based on a chronic standard.

Although there is periodic flow in Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek upstream of Vista WWTP, the 1E3 and 30E3 monthly low flows are set at zero based on information the Division has at this time. For this analysis, low flows are summarized in Table A-5.

Table A-5

Low Flows for Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek at the Vista WWTP

Low Flow (cfs)	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
1E3 Acute	0	0	0	0	0	0	0	0	0	0	0	0	0
7E3 Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
30E3 Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0

The ratio of the low flow of Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek to the Vista WWTP design flow is 0:1

Note that since the low flow has been determined to be zero, the ambient water quality discussion is unnecessary and has therefore been deleted in this WQA. This is explained in more detail under the Technical Information discussion in Section VI.

Mixing Zones

The amount of the available assimilative capacity (dilution) that may be used by the permittee for the purposes of calculating the WQBELs may be limited in a permitting action based upon a mixing zone analysis or other factor. These other factors that may reduce the amount of assimilative capacity available in a permit are: presence of other dischargers in the vicinity; the presence of a water diversion downstream of the discharge (in the mixing zone); the need to provide a zone of passage for aquatic life; the likelihood of bioaccumulation of toxins in fish or wildlife; habitat considerations such as fish spawning or nursery areas; the presence of threatened and endangered species; potential for human exposure through drinking water or recreation; the possibility that aquatic life will be attracted to the effluent plume; the potential for adverse effects on groundwater; and the toxicity or persistence of the substance discharged.

Unless a facility has performed a mixing zone study during the course of the previous permit, and a decision has been made regarding the amount of the assimilative capacity that can be used by the facility, the Division assumes that the full assimilative capacity can be allocated. Note that the review of mixing study considerations, exemptions and perhaps performing a new mixing study (due

to changes in low flow, change in facility design flow, channel geomorphology or other reason) is evaluated in every permit and permit renewal.

If a mixing zone study has been performed and a decision regarding the amount of available assimilative capacity has been made, the Division may calculate the water quality based effluent limitations (WQBELs) based on this available capacity. In addition, the amount of assimilative capacity may be reduced by T&E implications.

Since the receiving stream has a zero low flow as calculated above, the WQBELs would be equal to the WQS, and therefore consideration of full or reduced assimilative capacity is inconsequential.

Ambient Water Quality

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 31*, and as outlined in the Division's Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits (WQP-19). The ambient water quality was not assessed for Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek because the background in-stream low flow condition is zero, and because no ambient water quality data are available for Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek upstream of the Pagosa Area Water and Sanitation District WWTP discharge.

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 31*, and as outlined in the Division's Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits (WQP-19). Ambient water quality is evaluated in this WQA analysis for use in determining assimilative capacities and in completing antidegradation reviews for pollutants of concern, where applicable.

V. Facility Information and Pollutants Evaluated

Facility Information

The Vista WWTP is located at NW 1/4 of the SW 1/4 of S36, T36N, R2 1/2 W, N.M.P.M.; 100 Lyn Ave in Pagosa Springs, CO; at 37 15' 21" latitude N and 107 06' 13" longitude W in Archuleta County. The design capacity for the Vista WWTP is 3.75 MGD January through March and 3.9 MGD April through December. Wastewater treatment is accomplished using a mechanical wastewater treatment process. The technical analyses for all parameters except ammonia include assessments of the assimilative capacity based on the 3.9 MGD design capacity because it sets more stringent limits. Ammonia modeling and limitations are based on the seasonal design flows of 3.75 MGD January-March and 3.9 MGD April-December.

An assessment of Division records indicate that there are no facilities discharging to the same stream segment or other stream segments immediately upstream or downstream from Vista WWTP. Several facilities in the Pagosa Springs area are covered by general permits and have limitations set at the water quality standards. These facilities were not modeled in this WQA as they have a

minimal impact on the ambient water quality. Other facilities were located more than twenty miles from the Vista WWTP and thus were not considered. The nearest dischargers were located more than 6.5 miles northeast of Vista WWTP, and discharged into a different sub-basin (San Juan River sub-basin).

The Vista WWTP is the sole known point source contributor to Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek. The Highland Lagoon Wastewater Treatment Plant, located five miles north of Vista WWTP on stream segment COSJPI06a, has been eliminated. Vista WWTP now receives the sewerage formerly processed at Highland Lagoon WWTP. No other point sources were identified as dischargers to Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek downstream of the confluence with the Piedra River. Note that due to the intermittent nature of stormwater discharges, and that these types of discharges do not typically occur at low flow conditions, they are not considered in this WQA.

Additionally, due to the in-stream low flow of zero, the assimilative capacities during times of low flow are not affected by nearby contributions. Therefore, modeling nearby facilities in conjunction with this facility was not necessary.

Pollutants of Concern

Pollutants of concern may be determined by one or more of the following: facility type; effluent characteristics and chemistry; effluent water quality data; receiving water quality; presence of federal effluent limitation guidelines; or other information. Parameters evaluated in this WQA may or may not appear in a permit with limitations or monitoring requirements, subject to other determinations such as a reasonable potential analysis, mixing zone analyses, 303(d) listings, threatened and endangered species listings or other requirement as discussed in a permit rationale.

There are no site-specific in-stream water quality standards for BOD_5 or $CBOD_5$, TSS, percent removal, and oil and grease for this receiving stream. Thus, assimilative capacities were not determined for these parameters. The applicable limitations for these pollutants can be found in Regulation No. 62 and will be applied in the permit for the WWTP.

The following parameters were identified by the Division as pollutants to be evaluated for this facility:

- *E. coli*
- Ammonia
- Temperature
- Salinity
- Metals and Cyanide
- Nonylphenol
- Sulfate

It is the Division's standard procedure to consider metals and cyanide as potential pollutants of concern for all major domestic WWTPs.

According to the *Rationale for Classifications, Standards and Designations of the San Juan River*, stream segment COSJPI06a is designated a water supply because the Pagosa Area W&SD #1 (#104300) withdraws water from Martinez Creek for domestic water supply.

However, there are no existing public water supply uses downstream from Vista WWTP. For this reason, the nitrate standard, which is applied at the point of intake to a water supply, is not evaluated as part of this analysis.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

VI. Determination of Water Quality Based Effluent Limitations (WQBELs)

Technical Information

Note that the WQBELs developed in the following paragraphs, are calculations of what an effluent limitation may be in a permit. The WQBELs for any given parameter, will be compared to other potential limitations (federal Effluent Limitations Guidelines, State Effluent Limitations, or other applicable limitations) and typically the more stringent limit is incorporated into a permit. If the WQBEL is the more stringent limitation, incorporation into a permit is dependent upon a reasonable potential analysis.

In-stream background data and low flows evaluated in Sections II and III are used to determine the assimilative capacity of Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek near the Vista WWTP for pollutants of concern, and to calculate the WQBELs. For all parameters except ammonia, it is the Division's approach to calculate the WQBELs using the lowest of the monthly low flows (referred to as the annual low flow) as determined in the low flow analysis. For ammonia, it is the standard procedure of the Division to determine monthly WQBELs using the monthly low flows, as the regulations allow the use of seasonal flows.

The Division's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the Division to calculate the WQBELs, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated WQBEL
M_3 = Water Quality Standard, or other maximum allowable pollutant concentration

When Q_1 equals zero, Q_2 equals Q_3, and the following results:

$$M_2 = M_3$$

Because the low flow (Q_1) for Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek is zero, the WQBELs for Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek for the pollutants of concern are equal to the in-stream water quality standards.

A more detailed discussion of the technical analysis is provided in the pages that follow.

Calculation of WQBELs

Using the mass-balance equation provided in the beginning of Section VI, the acute and chronic low flows set out in Section IV, ambient water quality as discussed in Section IV, and the in-stream standards shown in Section III, the WQBELs for Vista WWTP were calculated. The data used and the resulting WQBELs, M_2, are set forth in Table A-6a for the chronic WQBELs and A-6b for the acute WQBELs.

Where a WQBEL is calculated to be a negative number and interpreted to be zero, the Division standard procedure is to allocate the water quality standard to prevent further degradation of the receiving waters.

***E. coli*:** There are no point sources discharging *E. coli* within one mile of the Vista WWTP. Thus, WQBELs were evaluated separately. In the absence of *E. coli* ambient water quality data, fecal coliform ambient data are used as a conservative estimate of *E. coli* existing quality. For *E. coli*, the Division establishes the 7-day geometric mean limit as two times the 30-day geometric mean limit and also includes maximum limits of 2,000 colonies per 100 ml (30-day geometric mean) and 4,000 colonies per 100 ml (7-day geometric mean). This 2000 colony limitation also applies to discharges to ditches.

Temperature:

The 7E3 low flow is 0, so the discharge is to an effluent dependent (ephemeral stream without the presence of wastewater) water, therefore in accordance with Regulation 31.14(14), no temperature limitations are required.

Table A-6a

Chronic WQBELs

Parameter	Q_1 *(cfs)*	Q_2 *(cfs)*	Q_3 *(cfs)*	M_1	M_3	M_2
E. coli (#/100 ml)	0	6	6	1	205	***205***
Al, TR (µg/l)	0	6	6	0	87	***87***
As, TR (µg/l)	0	6	6	0	0.02	***10****
Cd, Dis (µg/l)	0	6	6	0	1.2	***1.2***
Cr+3, Dis (µg/l)	0	6	6	0	231	***231***
Cr+6, Dis (µg/l)	0	6	6	0	11	***11***
Cu, Dis (µg/l)	0	6	6	0	29	***29***
Fe. Dis (µg/l)	0	6	6	0	300	***300***
Fe, TR (µg/l)	0	6	6	0	1000	***1000***
Pb, Dis (µg/l)	0	6	6	0	11	***11***
Mn, Dis (µg/l)	0	6	6	0	50	***50***

Mo, TR (µg/l)	0	6	6	0	160	***160***
Hg, Tot (µg/l)	0	6	6	0	0.01	***0.01***
B, Tot (mg/l)	0	6	6	0	0.75	***0.75***
Sulfate (mg/l)	0	6	6	0	250	***250***
Ni, Dis (µg/l)	0	6	6	0	168	***168***
Se, Dis (µg/l)	0	6	6	0	4.6	***4.6***
Zn, Dis (µg/l)	0	6	6	0	405	***405***
Ag, Dis (µg/l)	0	6	6	0	3.5	***3.5***
Nonylphenol (µg/l)	0	6	6	0	6.6	***6.6***

* Because the arsenic limitation is a range, the WQBEL is developed on the first value in the range (0.02) but the limitation shall not be more stringent than the second number in the range (10).

Table A-6b

Acute WQBELs

Parameter	***Q_1 (cfs)***	***Q_2 (cfs)***	***Q_3 (cfs)***	***M_1***	***M_3***	***M_2***
Al, TR (µg/l)	0	6	6	0	10071	***10071***
As, Dis (µg/l)	0	6	6	0	340	***340***
Cd, Dis (µg/l)	0	6	6	0	9.1	***9.1***
Cr+3, Dis (µg/l)	0	6	6	0	1773	***1773***
Cr+6, Dis (µg/l)	0	6	6	0	16	***16***
Cu, Dis (µg/l)	0	6	6	0	50	***50***
CN, Free (µg/l)	0	6	6	0	5	***5***
Pb, Dis (µg/l)	0	6	6	0	281	***281***
Mn, Dis (µg/l)	0	6	6	0	4738	***4738***
Ni, Dis (µg/l)	0	6	6	0	1513	***1513***
Se, Dis (µg/l)	0	6	6	0	18.4	***18***
Ag, Dis (µg/l)	0	6	6	0	22	***22***
Zn, Dis (µg/l)	0	6	6	0	467	***467***
Nonylphenol (µg/l)	0	6	6	0	28	***28***

Ammonia: The Ammonia Toxicity Model (AMMTOX) is a software program designed to project the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. To develop data for the AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year.

The pH data sets reflecting upstream ambient receiving water conditions were unnecessary in this analysis due to the zero low flow condition upstream from the discharge to Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek.

However, effluent pH data was available from Vista WWTP, reflecting a period of record from January 2006 through May 2011, and was used to establish the average facility contributions in the AMMTOX model.

There was no temperature data available for Vista WWTP that could be used as adequate input data for the AMMTOX model. Therefore, the Division standard procedure is to rely on statistically-based, regionalized data for temperature compiled from similar facilities.

Upstream ammonia data for each month was not available to adequately represent monthly ambient water quality concentrations for the AMMTOX. Thus, the mean total ammonia concentration found in Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek as summarized in Table A-5 was used as an applicable upstream ammonia concentration reflective of each month.

The AMMTOX may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- Stream velocity = $0.3Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum, and time of day of occurrence
- pH rebound was set at the default value of 0.2 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The results of the ammonia analyses for the Vista WWTP are presented in Table A-7.

Table A-7

AMMTOX Results for Stevens Draw, tributary to Martinez Creek and then Stollsteimer Creek at the Vista WWTP

Design of 3.75 MGD (5.8 cfs) January- March and 3.9 MGD (6 cfs) April-December

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	6.3	28
February	5.9	26
March	4.8	20
April	4.8	24
May	4.3	25
June	3.8	25
July	3.1	24
August	3.0	23
September	3.3	24
October	3.6	22
November	5.0	27
December	6.3	29

Agricultural Use Parameters (SAR and EC):

Section 31.11(1)(a)(iv) of *The Basic Standards and Methodologies for Surface Waters* (Regulation No. 31) includes the narrative standard that State surface waters shall be free of substances that are

harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life. The interpretation of these conditions (i.e., "no harm to plants" and "no harm to the beneficial uses") and how they were to be applied in permits were contemplated by the Division as part of an Agricultural Work Group, and culminated in the most recent policy entitled *Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops* (hereafter the Narrative Standards policy)

The discharge is from a domestic WWTP that receives only typical domestic sewage influent and the TDS of the effluent is less than 800 mg/l. Therefore, in accordance with the Division's Narrative Standard Policy WQP-24, no SAR or ECs limitations are required.

VII. Antidegradation Evaluation

As set out in *The Basic Standards and Methodologies for Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA analysis.

According to the *Classifications and Numeric Standards for San Juan River and Dolores River Basins*, stream segment COSJPI06a is Use Protected. Because the receiving waters are designated as Use Protected, no antidegradation review is necessary in accordance with the regulations. Thus, for purposes of this WQA analysis, antidegradation review requirements have been met and no further antidegradation evaluation is necessary. An antidegradation review is required for this segment if new or increased impacts are found to occur.

VIII. Technology Based Limitations

Federal Effluent Limitation Guidelines

The Federal Effluent Limitation Guidelines for domestic wastewater treatment facilities are the secondary treatment standards. These standards have been adopted into, and are applied out of, Regulation 62, the Regulations for Effluent Limitations.

Regulations for Effluent Limitations

Regulation No. 62, the Regulations for Effluent Limitations, includes effluent limitations that apply to all discharges of wastewater to State waters, with the exception of storm water and agricultural return flows. These regulations are applicable to the discharge from the proposed discharge.

According to Part 62.4(2) of the Regulations for Effluent Limitations "If the Commission has not so promulgated effluent limitation guidelines for any particular industry, but that industry is subject to effluent limitation guidelines promulgated by the United States Environmental Protection Agency pursuant to the Federal Water Pollution Control Act of 1972, the effluent from these industries shall be subject to the applicable EPA guidelines and shall not be subject to the effluent limitations of Regulation 62.4."

Table A-8 contains a summary of the applicable limitations for pollutants of concern at this facility.

Table A-8

Regulation 62 Based Limitations

Parameter	*30-Day Average*	*7-Day Average*	*Instantaneous Maximum*
BOD_5	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	NA
TSS, mechanical plant	30 mg/l	45 mg/l	NA
TSS Percent Removal	85%	NA	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 s.u.
Oil and Grease	NA	NA	10 mg/l

IX. References

Regulations:

The Basic Standards and Methodologies for Surface Water, Regulation 31, Colorado Department Public Health and Environment, Water Quality Control Commission, effective 9/30/2012.

Classifications and Numeric Standards for San Juan River and Dolores River Basins, Regulation No. 34, Colorado Department Public Health and Environment, Water Quality Control Commission, effective September 2012.

Colorado River Salinity Standards, Regulation 39, CDPHE, WQCC, effective 8/30/1997.

Regulations for Effluent Limitations, Regulation 62, CDPHE, WQCC, effective 1/30/2012.

Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List, Regulation 93, Colorado Department Public Health and Environment, Water Quality Control Commission, effective 3/30/2012.

Policy and Guidance Documents:

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, December 2001.

Memorandum Re: First Update to (Antidegradation) Guidance Version 1.0, Colorado Department Public Health and Environment, Water Quality Control Division, April 23, 2002.

Rationale for Classifications, Standards and Designations of Segments of the San Juan River, Colorado Department Public Health and Environment, Water Quality Control Division, effective June 2012.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Colorado Mixing Zone Implementation Guidance, Colorado Department Public Health and

Environment, Water Quality Control Division, effective April 2002.

Policy for Conducting Assessments for Implementation of Temperature Standards in Discharge Permits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-23, effective July 3, 2008.

Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-24, effective March 10, 2008.

Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-19, effective May 2002.